The State of the Lake Huron Fish Community in 1999

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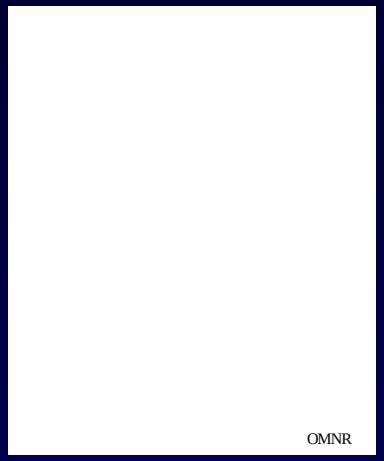
OMNR

Lake Huron first Great Lakes discovered by European explorers.

Lake Huron ecosystem undergone many changes since that time.

Fisheries collapsed by the 1950s from sea lamprey predation and over fishing



National Library of Canada

Alewife invaded and their population exploded

- With no predators to control nuisance species, die-offs of alewives were common.
- Beaches littered for miles during 1960s
- Fishing and tourism detrimentally affected

Sea lamprey control allowed stocking and survival of Pacific salmon, lake trout and other predators.

Restocking controlled alewife and smelt, prevented alewife die-offs while providing exceptionally good fishing.

Recovery of recreational & commercial fisheries in Great Lakes

major success story in fisheries management

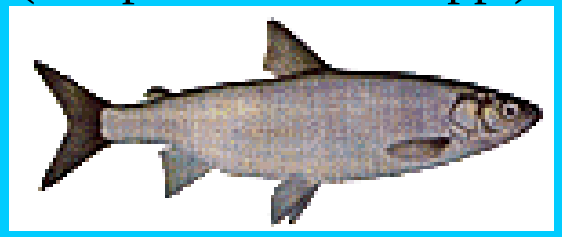
Historic Lake Huron Ecosystem

Lake Trout

Walleye

Burbot

Lake Herring
(Deepwater Cisco Spp.)



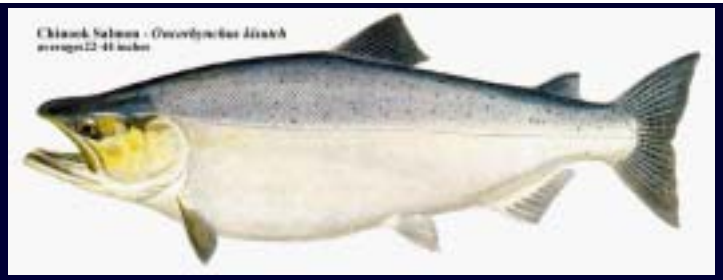
Sculpins

Lake Whitefish

Round Whitefish

Current Lake Huron Ecosystem

Sea Lamprey



Chinook Salmon

Rainbow Trout

Lake Trout

Brown Trout

Burbot

Walleye

Alewife

Smelt

Lake Whitefish

Bloater Chub

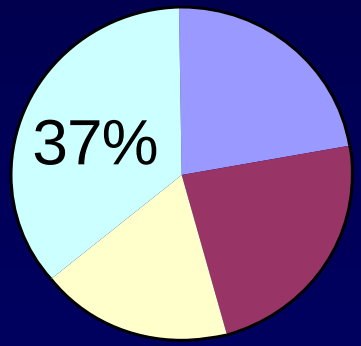
Lake Herring (Cisco)

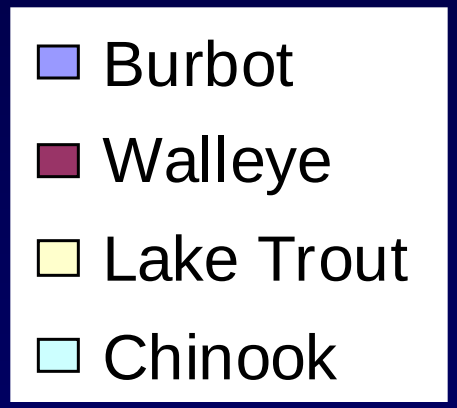
Sculpins

Round Whitefish

1998 Predator Biomass

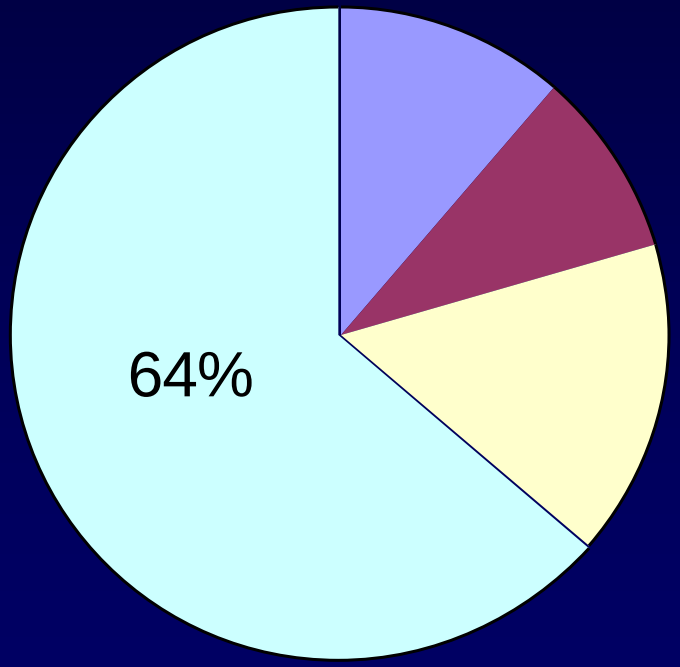
11.6 metric tons

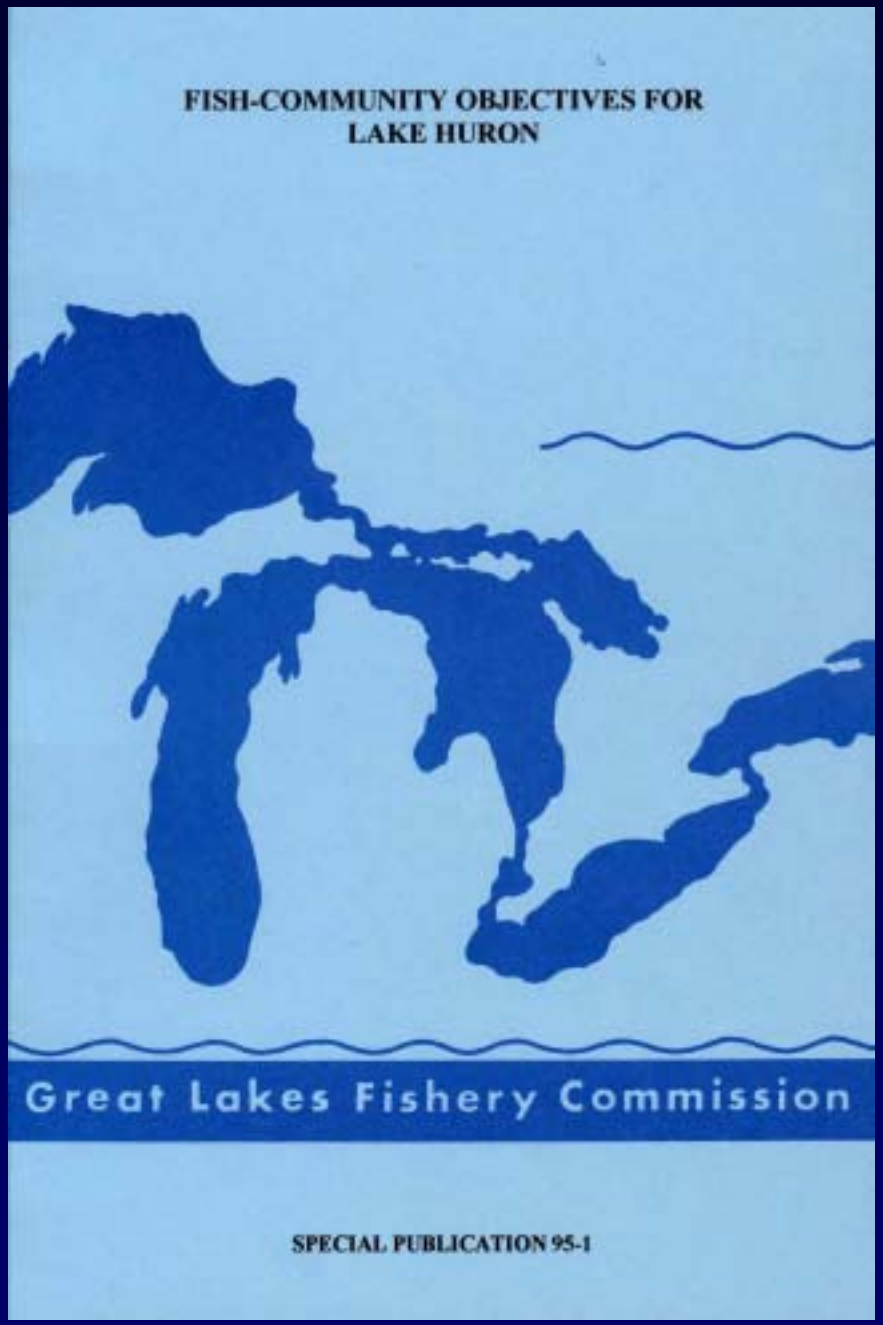




1998 Consumption by key predators

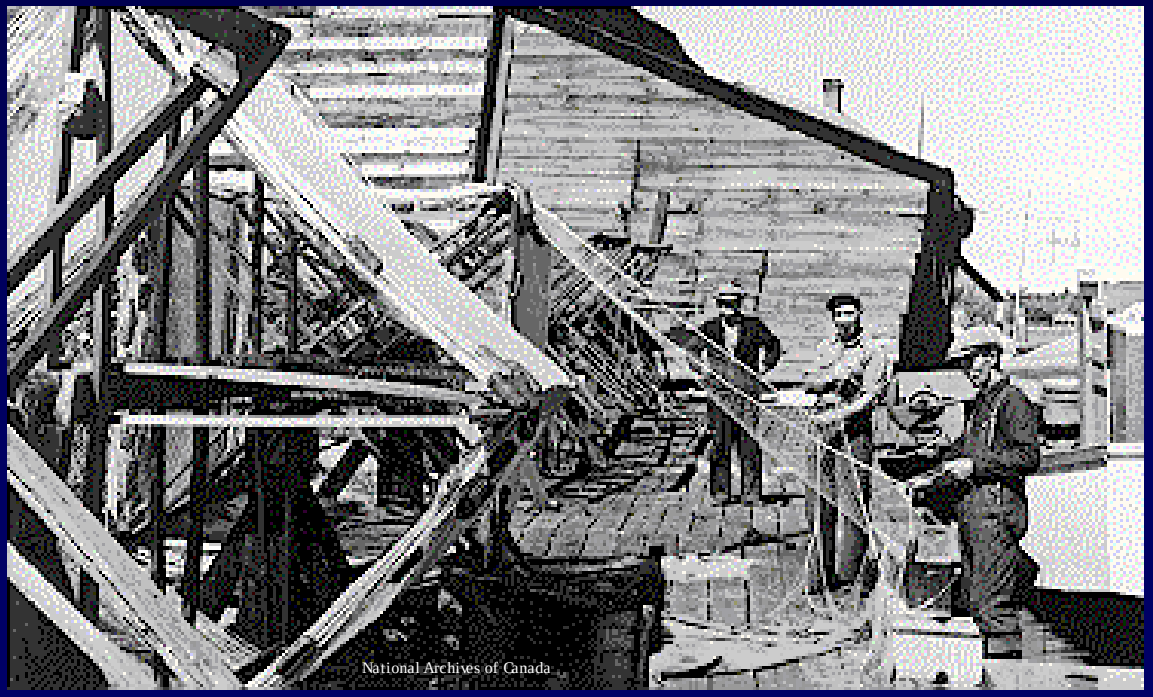
44 metric tons





- In 1990's GLFC coordinated Fish Community Objectives for each Great Lake.
- In most cases fish community objectives have yield targets based on historic landings from 1912-1940.

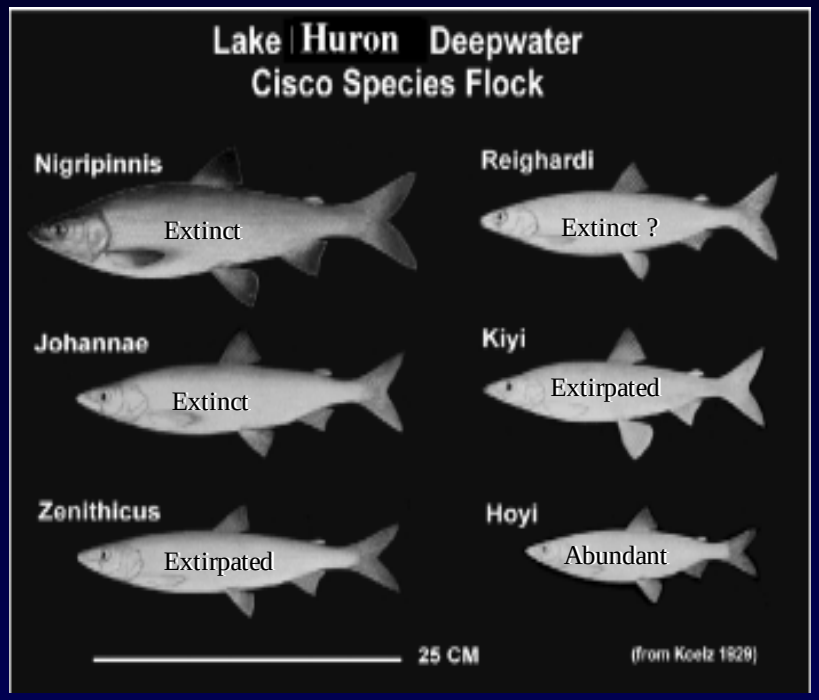
Are historic harvest levels sustainable ?



Comparing current harvest with historic levels is valuable exercise but needs to be done in context.

1 The Goderich fishing fleet, 1884.
Ontario. Dept. of Fisheries, *Fifth Annual Report ... 1903* (Toronto: L.K. Cameron, King's Printer, 1904), p. ii; National Library of Canada, NL 13100.

- Historic yield may provide idea of what fully recovered fish community might sustain rather than a specific target.
- Need to target some form of historic fish community structure dominated by self-sustaining populations of top predators.



- Historic yields may not be achievable or sustainable due to changes in the predator/prey community.

- Non-native prey (alewife and smelt) may not be able to sustain historic yields.

- These prey not as efficient in harnessing primary and secondary production of lake.

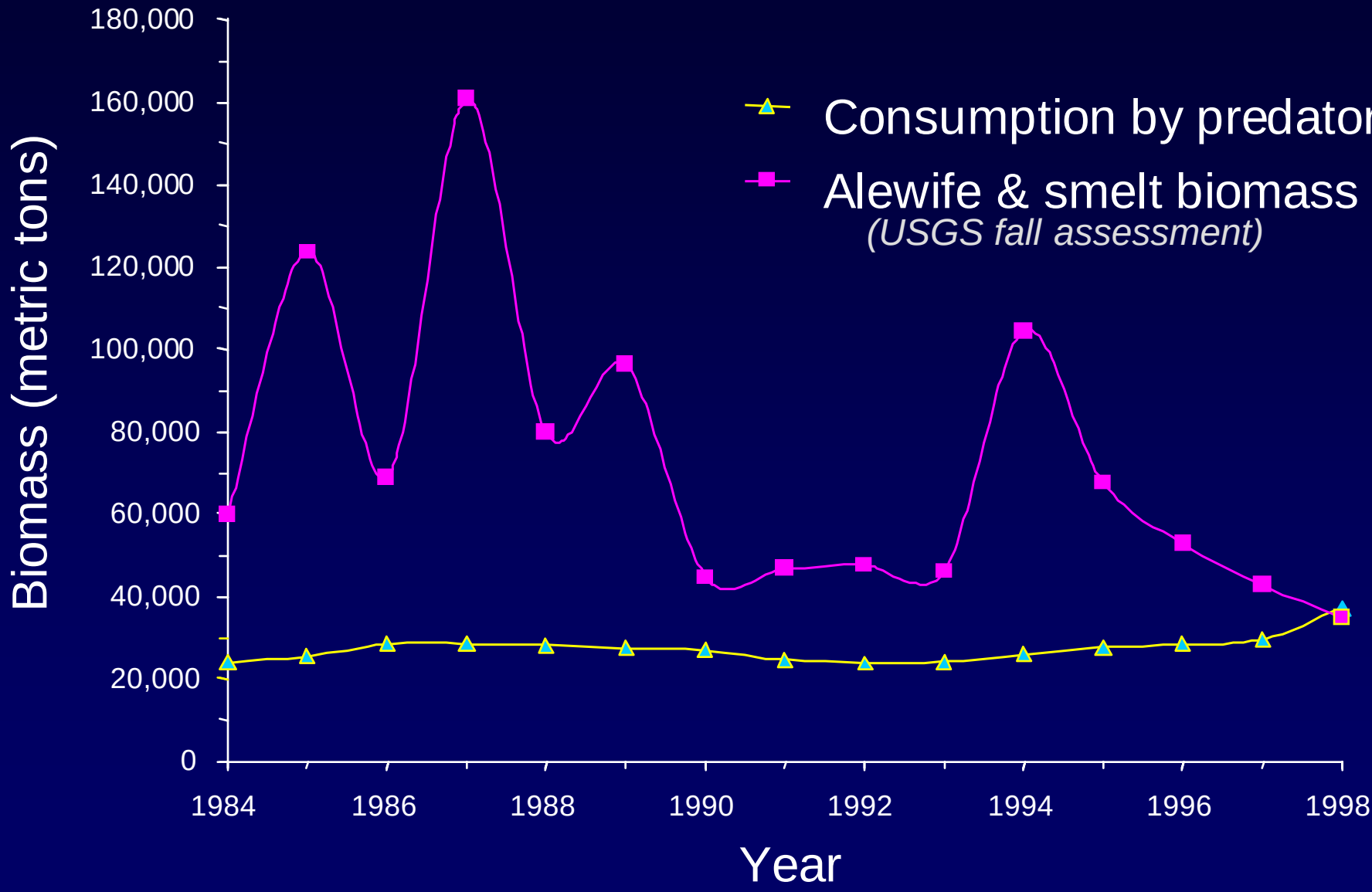
- Introduction of non-natives species may divert much of the primary and secondary production to areas not utilized by introduced salmonids.

- Native lake trout would have once utilized some portion of the benthic prey.

Zebra mussel
(*Dreissena polymorpha*)

Spiny Water Flea
(Bythotrephes cederstroemi)

Comparison of estimated predator consumption (modeling) to alewife and smelt biomass in the main basin, 1984-1998



- Alewife and smelt may limit FCO's attainment through egg and fry predation and competition.

- Alewife predation by salmonine predators implications for early mortality syndrome.

- High levels thiaminase in alewife (and smelt), breaks down thiamine in predators and leaves eggs low in essential vitamin and high mortality.

- Chinook salmon diet, should be especially susceptible.

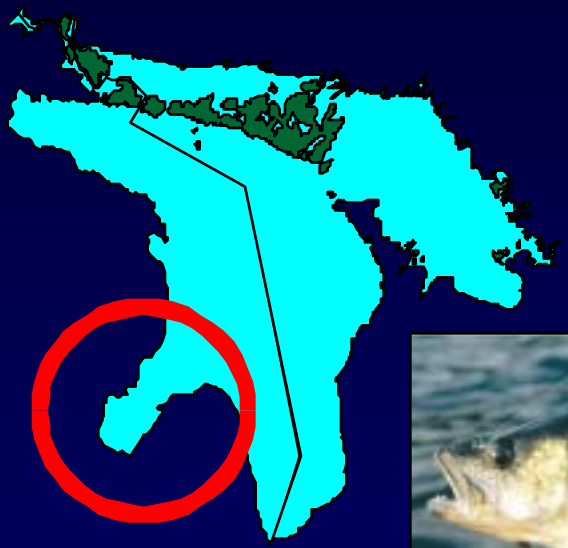
- Great Lakes fisheries communities have been greatly affected by sea lamprey.
- St. Marys River largest source of sea lamprey in Great Lakes.

- Exceeding production from all other tributaries combined.
- Chemically treated in 1998/99, early results encouraging, but sea lamprey continue to impede achievement of FCO's for species such as lake trout.

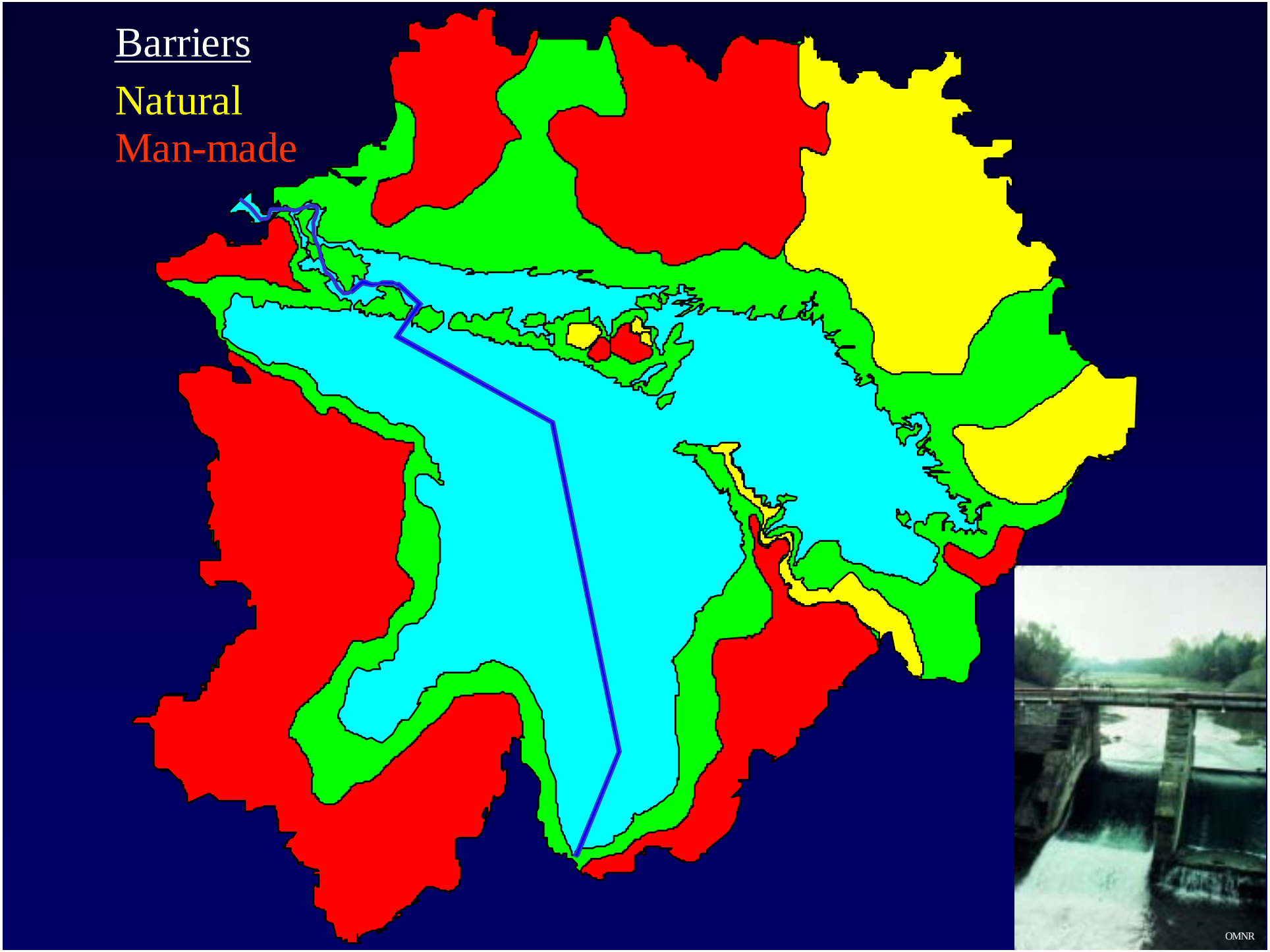
- Sea lamprey abundance above targets for 2000.
- 80% reduction by 2010 difficult to achieve without increased control on St. Marys and other tributaries.
- Appears Saginaw River contributing to sea lamprey numbers much higher than previously assumed.

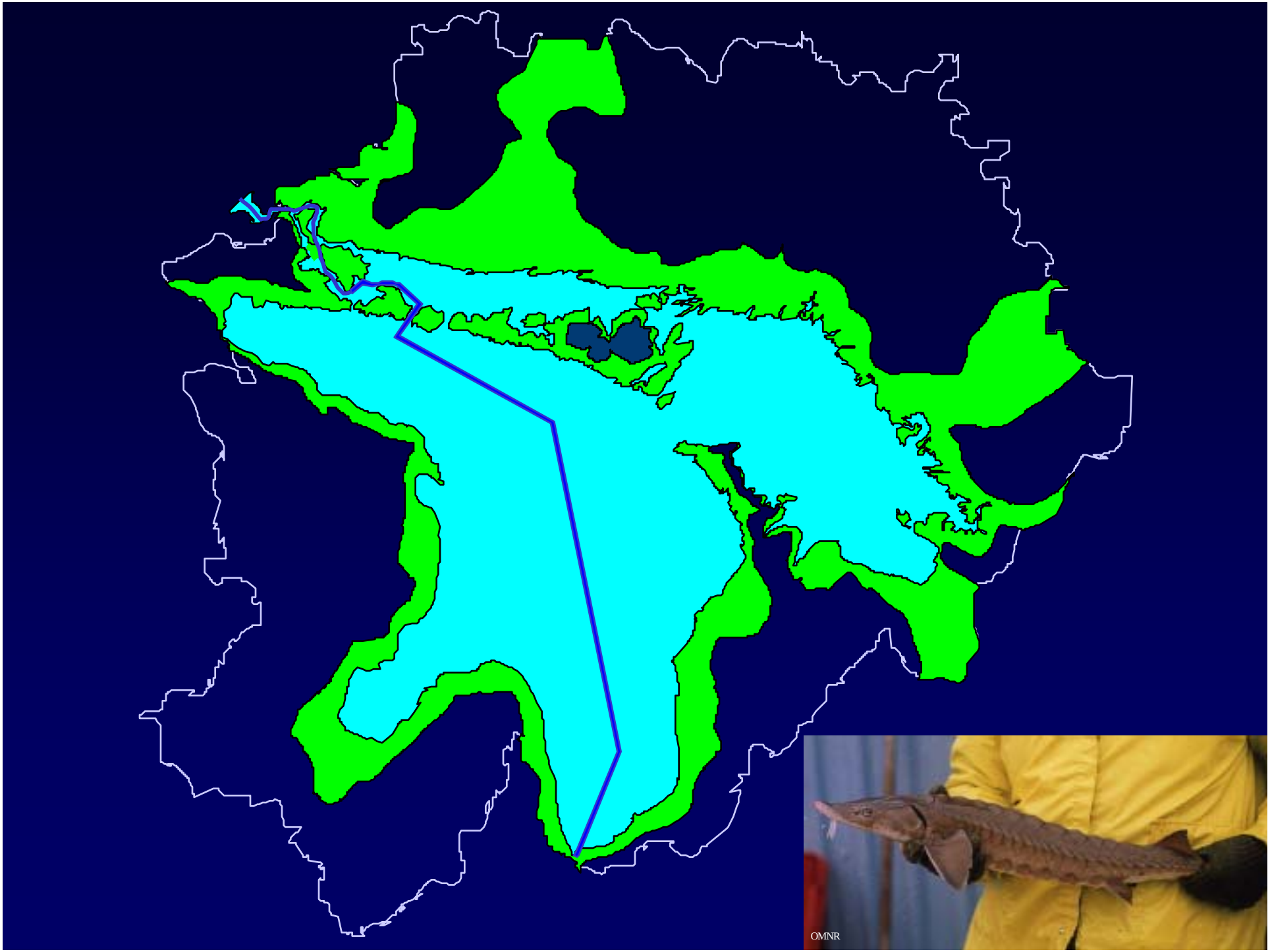
- Lack of some understanding of linkages between fish production and habitat supply.
- Habitat objectives for Lake Huron may be technically achievable, but political and human limitations may make them unattainable.

- Achievement of FCO's for walleye, yellow perch, channel catfish and lake herring requires habitat rehabilitation of Saginaw Bay.



- Bay historically most productive area of lake and accounted for much of lakewide yield of these species.


Barriers
Natural
Man-made
OMNR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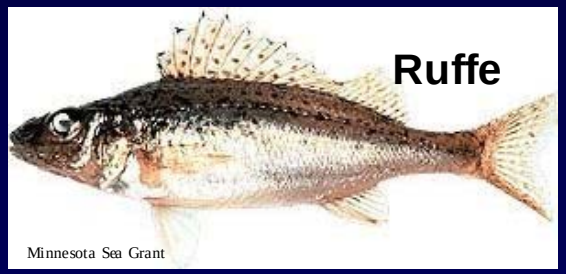
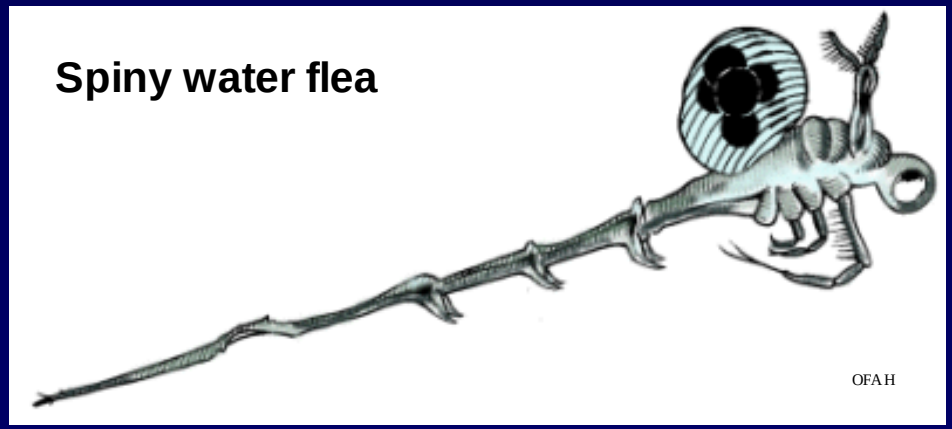
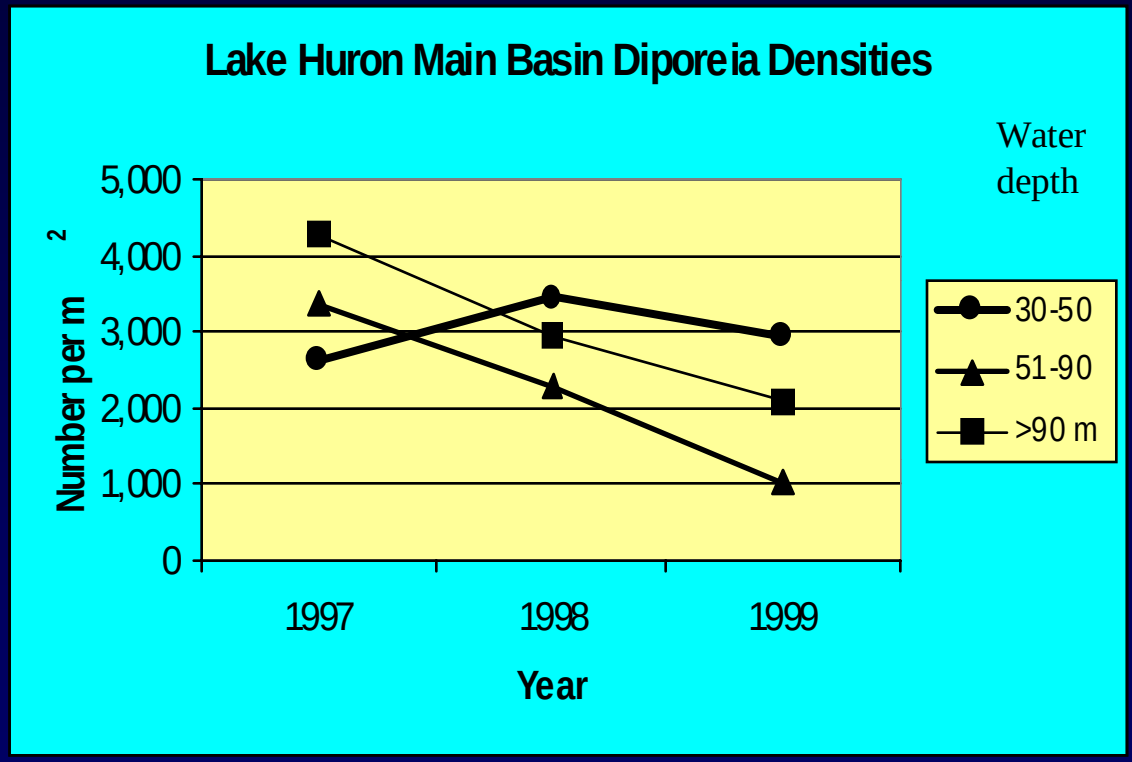
- Recent invading species heighten uncertainty for expectations of the Lake Huron ecosystem.

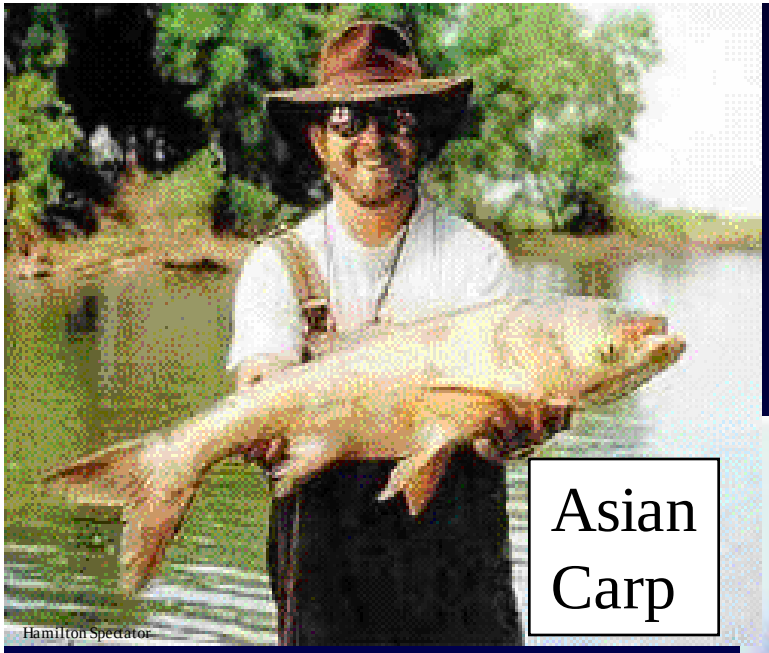




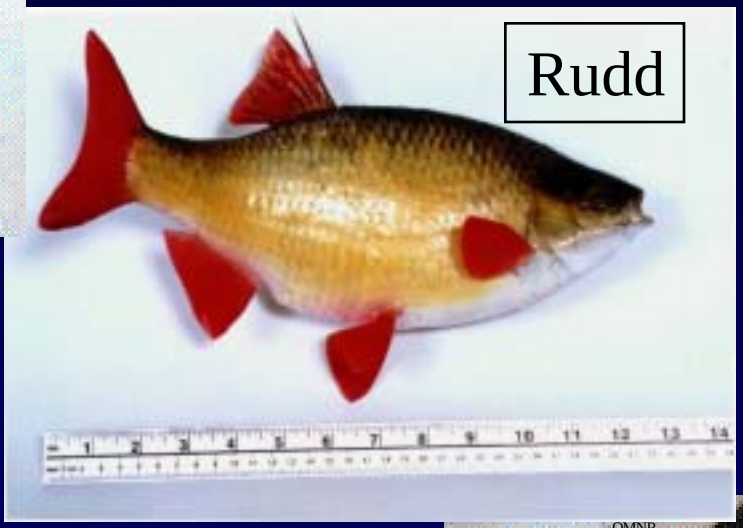
- Suspicion zebra mussels contribute to reduction and elimination of *Diporeia* (important invertebrate food [amphipod] for fish including lake whitefish).



- Similar to situation occurring on Lake Michigan and western Lake Ontario.



- Disruptions of food web may degrade Lake Huron ecosystem.

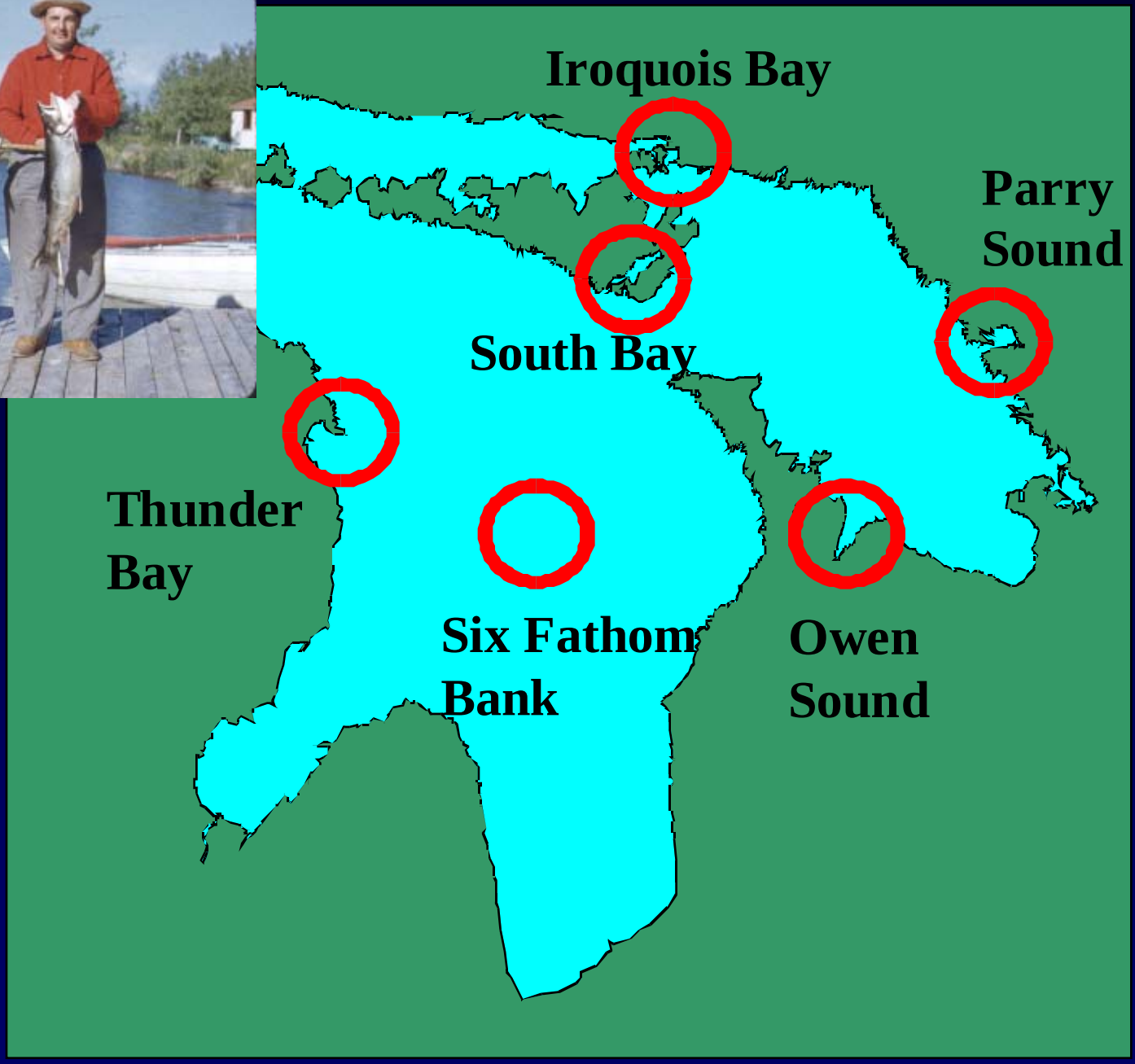


- New non-native species introductions

  make predictions for a changing ecosystem difficult.

- Limiting future introductions a priority FCO.

Six sites of lake trout natural reproduction.



Wild lake trout spawner catch per unit effort, 1988 to 2001,Horse Island site, Parry Sound.

Fish per Trapnet Night

16
14
12
10
8
6
4
2
0

1988 1990 1992 1994 1996 1998 2000

Year

What worked for Parry Sound:

- Effective sea lamprey control
- Stocking of progeny from native stocks
- Stocking at levels exceeding 4.5 yearlings/ha
- Significant exploitation control
- Cessation of stocking when sufficient natural reproduction occurs
- Protection of fish during all times of the year

Despite successes:
sea lamprey, commercial & sportfishing harvest continue to impede further success.

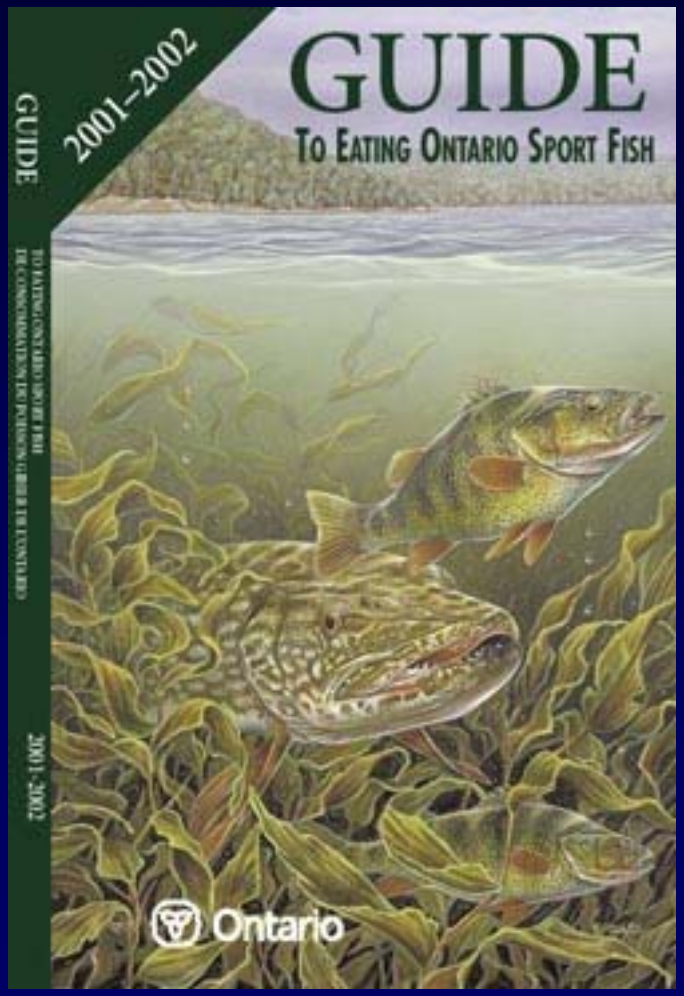
Why Lake Trout ?

- Healthy lake trout = healthy environment (barometer)
- Broad niche - deep/shallow water, inshore/offshore
- Original native keystone predator in Lake Huron
- Best suited as dominant predator (adapted)
- Food requirements varied resulting in stable populations
- Remain in lake basins where stocked
- Potentially self-sustaining
- Can provide economic returns for commercial and sport fisheries.
- Cultural value to commercial, sport fisheries and First Nations.

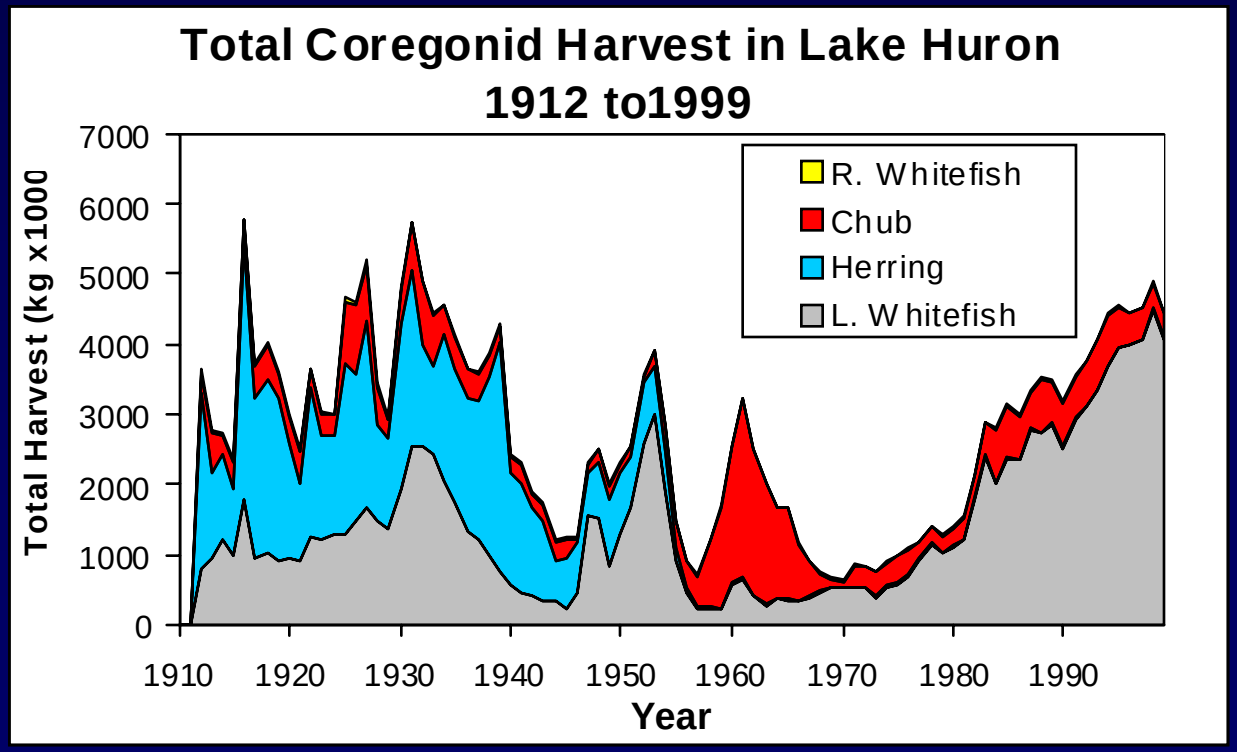

Collingwood
Severn Sound
GBA
Nipigon Bay
Jackfish Bay
Thunder Bay
CANADA
U.S.A.
Lake Superior
Torch Lake
Deer Lake-Carp Creek/River
St. Louis Bay/River
St. Marys River
Spanish River Mouth
Manistique River
Georgian Bay
Lake Huron
Collingwood Harbour
Bay of Quinte
Port Hope
Metro Toronto
Hamilton Harbour
Lake Ontario
Oswego River
Rochester Embayment
Eighteen Mile Creek
Niagara River (New York)
Buffalo River
Niagara River (Ontario)
St. Lawrence River (Cornwall)
St. Lawrence River (Massena)
Menominee River
Fox River/Southern Green Bay
Saginaw River/Saginaw Bay
Lake Michigan
Sheboygan River
White Lake
Muskegon Lake
Milwaukee Estuary
Waukegan Harbor
Grand Calumet River
Kalamazoo River
Clinton River
Detroit River
Rouge River
River Raisin
Maumee River
St. Clair River
Wheatley Harbour
Black River
Cuyahoga River
Lake Erie
Presque Isle Bay
Ashtabula River
N
Legend
Canada
U.S.A.
Delisted AOC
Connecting Channels
50 0 350 km

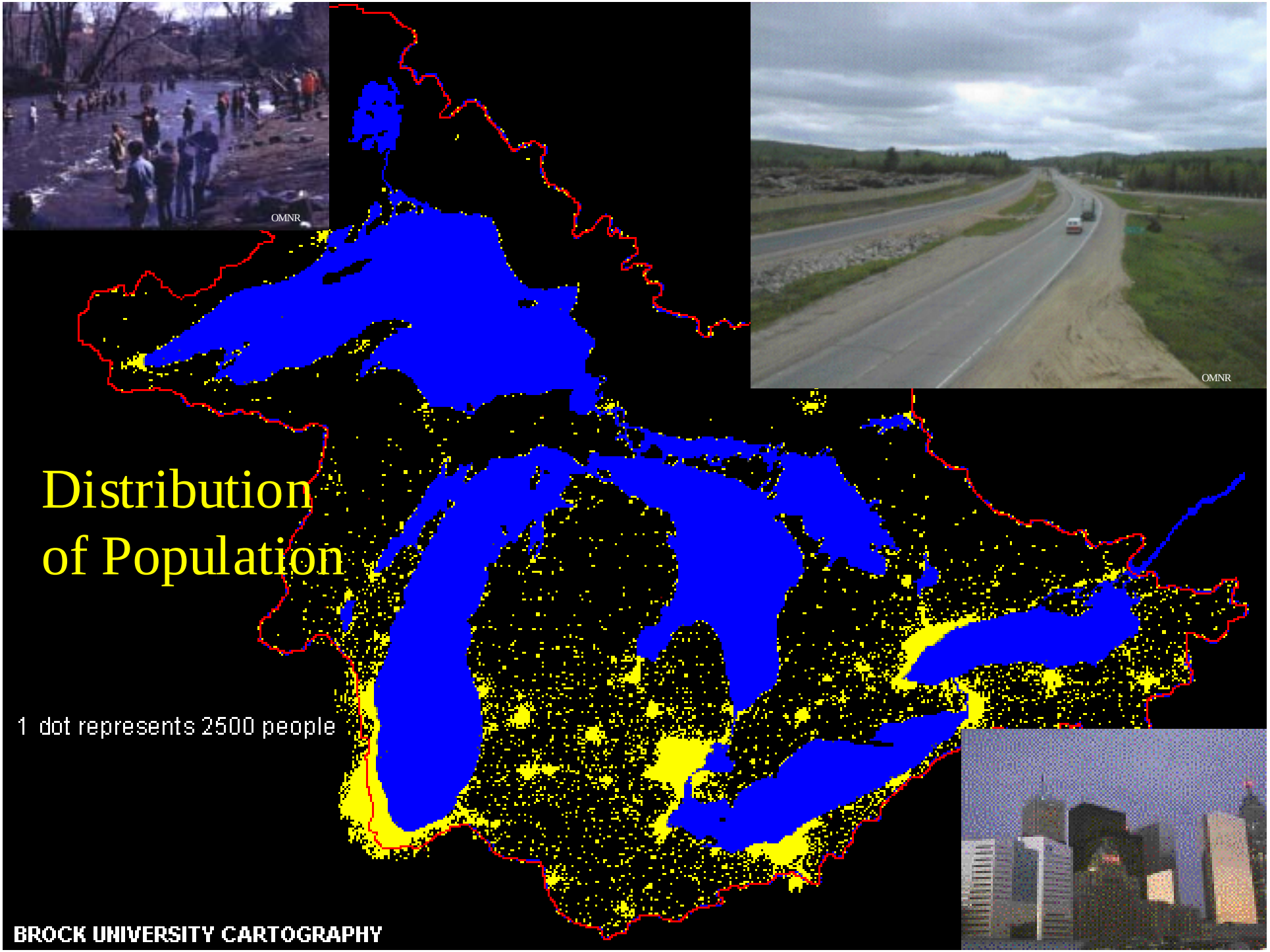
- Need to strive to reduce direct discharge and long-range atmospheric loading of contaminants.

- Required to remove fish species from consumption advisories and meet the contaminant objectives of the GLWQA.



Despite concerns with *Diporeia* declines lake whitefish yields continue to be maintained at all time historic levels.

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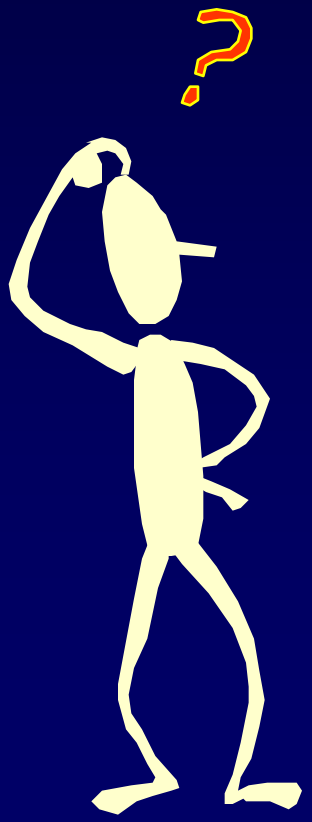
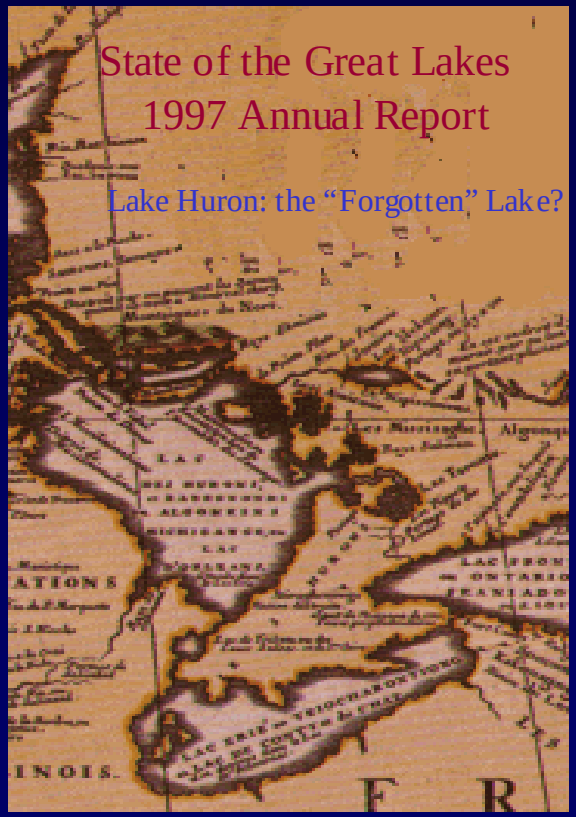
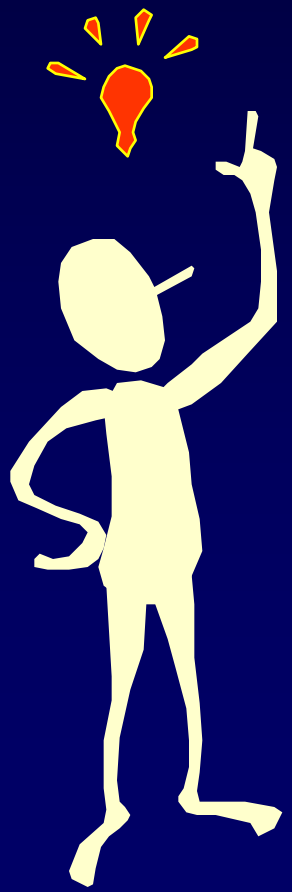
Distribution of Population
1 dot represents 2500 people
BROCK UNIVERSITY CARTOGRAPHY

- Lake Huron previously termed “The Forgotten Lake”.
- General feeling fundamentally in better “shape” than other Great Lakes.





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Great Lakes Fishery Commission
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RESOURCE AUTHORITY
THE STATE OF LAKE HURON IN 1992
Great Lakes Fishery Commission
SPECIAL PUBLICATION 95-2
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